Influences on My Research over Sixty-five Years

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My most exciting research, in early years on the significance of acid rain, the correlation of mortality from three respiratory diseases with three different air pollutants, and the bio-accumulation of radioactive fallout, and in recent years on the initiation of North American peatlands and their accumulation of carbon during the postglacial period, has usually come about by chance and serendipity (Gorham 2012). I can, however, discern a reasonably clear trail for some of the many subjects I have studied. My earliest inspiration came in the late 1940s when, by a happy accident, I was enabled to undertake a Ph.D. program with the distinguished plant ecologist W. H. Pearsall, head of the Botany Department at University College, London. He provided me the example of a wide range of interests, including limnology and wetland ecology—both to become enduring interests of mine—as well as subjects as different as the physiology of the unicellular alga *Chlorella vulgaris*, and landscape ecology, in which he was a pioneer long before it became recognized as a sub-discipline (Pearsall 1950).

Early in my Ph.D. studies Pearsall suggested that I read a pioneering text on soil science by Hans Jenny (1941), which he described as more insightful than any text in plant ecology. In it Jenny pointed out that soil characteristics were the result of interactions among five environmental factors: climate, soil parent material, topography, biota, and time. This seemed to me the best approach to research in both plant ecology and environmental science, and I used it several times in studying environmental controls on water chemistry in lakes (e.g., Gorham 1955, 1961, Gorham et al. 1983). Another influence on these studies was the classic work on geochemistry by Clarke (1924), whose calculation of an average ionic composition for the world's fresh waters gave me a baseline against which to evaluate the chemistry of the lakes I was studying.

After I joined the faculty of the department in 1951 Pearsall remarked to me one day that very little was known about the productivity of natural vegetation, and proposed that we take a first step by investigating the range of biomass at the end of the growing season in pure stands of herbaceous vegetation in Britain (Pearsall and Gorham 1956). This led me in the 1970s to investigate, with my graduate student Maureen Somers, and later, visiting scholar Jack Bernard, the very important role of life history studies in calculating the biomass and productivity of sedges (Bernard and Gorham 1978). One of our studies had shown that shoot mass and height in several pure stands of different sedges declined logarithmically with shoot density. I then examined this relationship more broadly in stands of species ranging from mosses to tall trees, with the interesting result that over seven orders of magnitude in shoot mass and five orders of magnitude in shoot density a double logarithmic relationship applied, with a correlation coefficient of 0.987 (Gorham 1979). The relationship was $m = 9670\ d^{-1.49}$ (m = shoot dry mass in grams, d = shoots per square meter). It conformed closely to Yoda's rule (Yoda et al. 1963) for self-thinning within pure stands, in which shoot mass is proportional to the 3/2 power of the area occupied, whose reciprocal is density.

A clear influence on my many studies of fossil plant pigments in lake sediments was the early work of another Canadian, Jack Vallentyne (1955). My colleague John Mackereth brought his work to my attention, whereupon I and my graduate student Jon Sanger made a number of studies to establish that such pigments could help us to understand, among other things, the role of terrestrial vs. aquatic sources of organic matter to lake sediments (Gorham and Sanger 1975) and the paleolimnology of eutrophication (Gorham and Sanger 1976).

It is a great pleasure to recall these and other stimulating associations that allowed me to do so much interesting research over a long lifetime, and to acknowledge how much they meant to me.

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